

OPENING THE DOOR WITH METAMUSIC™

Abstract

The success of programs for children with developmental disabilities depends upon the learning environment created by the therapist, educator and parent. An auditory environment incorporating Metamusic opens the door to learning for many of these children. Metamusic is music containing Hemi-Sync™, a patented auditory guidance system developed by Robert A. Monroe. This sound technology uses multilayered binaural beats to facilitate improved focus of attention, emotional calming, and sensory organization. This paper describes the author's clinical experience using Metamusic in the rehabilitation of children with oral feeding disorders related to cerebral palsy and other sensorimotor disabilities.

The Challenge

Children with oral feeding disorders create a subgroup of infants and young children with developmental disabilities due to cerebral palsy and other sensorimotor disorders (Morris 1985b). Many of these youngsters present a complex picture of poor coordination of sucking, swallowing and breathing. Others experience severe defensive reactions to the sensory input of food, with major difficulties transitioning from breast or formula feedings to solid foods. Negative experiences related to gastrointestinal discomfort, force feedings, and silent aspiration may further complicate the picture—resulting in feeding resistance. Many children are nutritionally supported by feeding tubes as they make the slow transition to oral feedings. Others move slowly through the developmental progressions of feeding.

As a group, these children provide a major challenge to parents and therapists. We live in a culture that highly values the ability to eat. A mother's feelings of nurturing and parental adequacy are connected to her child's eating. Family stress increases when the child is unable to eat orally or has major feeding difficulties. Parents feel pressure when they need to get a calorically and nutritionally adequate diet into a child who eats slowly or is a picky eater because of sensory processing problems. This increases the anxiety level of both parents and children.

Therapy addresses the underlying problems with postural tone and movement of the body that influence coordination of the oral-motor and respiratory systems. Issues with oral defensiveness are viewed as part of a larger problem of sensory processing and integration. Approaches to reduce anxiety and increase self-confidence and trust enable both parent and child to learn the skills needed to become a competent and efficient feeder. Although specific

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Reprinted from: Schneck, D.J. and Schneck, J.K., (1997); *Music in Human Adaptation*, Blacksburg, VA: Virginia Tech Press, 167-181

strategies or techniques are introduced to facilitate this process, the underlying journey is one of empowering the child as a learner and self-healer.

Hemi-Sync Technology

In 1981 I was introduced to Hemi-Sync, and began to incorporate music tapes containing Hemi-Sync signals into my therapy programs. Hemi-Sync is a patented auditory guidance system developed by Robert A. Monroe that uses multilayered binaural beats to facilitate changes in consciousness. The binaural beats used in the creation of Hemi-Sync are generated by the auditory introduction of sound frequencies that differ by a very small amount. For example, if a frequency of 100 Hz is blended with a frequency of 107 Hz, a 7 Hz binaural beat will be heard. The listener perceives this as a wavering sound or warble tone. When one frequency is introduced to the right ear and the second is placed in the left ear, the brain integrates the two sounds. The binaural beat can be identified at a cortical level through an electro-encephalogram (EEG).

This response has been referred to as a frequency-following response, and has been demonstrated in audiological research (Hink et al 1980) and in studies of the brain's differential response to 7 Hz and 16 Hz binaural beats (Atwater 1996). Because the ear is not physiologically capable of hearing sounds below 20 Hz, the individual does not actually hear a 7 Hz tone. Only the original two frequencies of 100 Hz and 107 Hz are actually perceived. However, the brain creates the third frequency (i.e., 7 Hz) as a difference-tone or binaural-beat, and the central nervous system follows it, increasing its production of brain waves of this frequency (Oster, 1973).

The term "Hemi-Sync" was used by Monroe to describe this auditory-guidance system. Binaural beat frequencies that were created were identified on an EEG as having equal amplitude, location, and phase relationships in both cortical hemispheres. This reflected a hemispherically synchronized brain wave pattern. This is a naturally occurring phenomenon in brain wave recordings; however, it occurs relatively infrequently and lasts for a very brief time period. It has been associated more frequently with meditative and hypnagogic states of consciousness. When Hemi-Sync signals are introduced to the brain, the number of instances of brain wave coherence multiplies, and the duration of these synchronized periods increases.

The neuroanatomy of the auditory system supports such hemispheric synchronization. The fibers of the VIII cranial nerve divide, with the majority of fibers crossing in the superior olivary nuclei and traveling to the contralateral hemisphere. The remaining fibers

travel to the same, or ipsilateral side. Thus, each side of the brain receives auditory input from both ears. In addition, auditory information can reach the opposite hemisphere through crossing the fibers of the corpus callosum that connect the two hemispheres of the brain.

The reticular activating system [RAS], a large net-like area in the brainstem, filters incoming sensory information and interprets and reacts to data from both internal sources (i.e., emotions, beliefs) and external stimuli (i.e. touch, proprioception, auditory, visual). It plays a primary role in modulating sensory input and regulating states of arousal, focus of attention, and general level of awareness. The RAS is strongly involved in the processing of binaural beats. According to Swann (Swann et al 1982), the RAS regulates the cortical EEG. Ongoing studies suggest that Hemi-Sync induces changes in the EEG (Owens and Atwater 1995; Foster 1990; Hiew 1995; Kennerly 1994; Sadigh 1990), indicating that the signals are processed in the reticular activating system.

As Monroe studied listener responses to a wide variety of binaural beats, he found certain complex combinations of binaural beats to be more effective than other combinations. In addition, these multilayered combinations were more effective than binaural beats of single frequencies (Atwater, 1997). These sound patterns were further standardized on adult listeners and became the basis for the different Hemi-Sync sound sequences incorporated into the audio-tapes used in the Monroe Institute programs.

The initial Hemi-Sync tapes were a blend of Hemi-Sync sound patterns in a background of pink sound or natural ocean surf. Pink sound is white noise which amplifies lower frequency sounds and reduces high frequency sounds, creating a more pleasing natural sound. These tapes included verbal elements such as breathing exercises, guided relaxation, affirmation, and guided visualization. They contained a directed purpose of facilitating states of consciousness as varied as sleep, reverie, intuitive, and transpersonal states of consciousness. Adult listeners consistently reported increased physical relaxation, greater emotional calming, increased focus of attention, and greater access to internal imagery.

Metamusic

In the early 1980s Monroe began to incorporate many of the Hemi-Sync patterns developed for the guided tapes into a music background, which he called Metamusic. Metamusic tapes opened the door for children to benefit from Hemi-Sync sound patterns since the verbal content of the original tapes was

inappropriate. It allowed listeners of all ages to enjoy Hemi-Sync as an open, non-directed background for other activities such as reading, studying, sleep, and self-generated imagery.

Three distinctive Hemi-Sync sound patterns may be blended with the music component of Metamusic. Since there is a correlation between the predominant frequency of brain wave patterns and states of conscious awareness, different subjective states will be observed as listeners are introduced to different binaural beat combinations.

- **Relaxed focus** tapes are based on Hemi-Sync sound patterns that facilitate lower frequency brain wave patterns in a predominantly theta (4-7 Hz) range. This hypnagogic state has been associated with greater openness for learning (Budzynski, 1981). Most listeners experience the unique combination of increased physical relaxation with a high level of mental alertness, and a wide or open focus of attention.
- **Concentration** tapes incorporate higher frequency Hemi-Sync patterns in the alpha (8-12 Hz) and beta (13-26 Hz) ranges. Subjective reports include high level alertness combined with the increased narrow focus of attention used in task-oriented activities.
- **Sleep** tapes create the pattern of binaural beats that gradually move the listener into the very slow delta state (1-3 Hz) associated with deep sleep.

Metamusic and the Child with Developmental Disabilities

Formal Observation

Between 1981 and 1985 I completed a pilot study of 20 developmentally disabled children (Morris, 1985a). The children in this group were enrolled in a therapy program to remediate their oral feeding problems. An initial baseline period of 4-6 sessions observed the child's response to therapy without music. This was followed by a second period of 2-4 therapy sessions with a music background which did not contain Hemi-Sync sounds. These two segments of the program created a clinical observation profile for each child in a non-Hemi-Sync environment. A third period of observation introduced Hemi-Sync signals in the theta range (i.e. relaxed focus tapes) into the same music that was used in the second phase of the study. Informal written and videotaped data were recorded to document the child's progress in therapy

under each condition. Many children received therapy with a Metamusic background for 1-2 years.

Two of the children (10%) responded negatively to the music containing Hemi-Sync, and its use was discontinued. Three children (15%) showed minimal or inconsistent changes in the Hemi-Sync Metamusic environment. Fifteen (75% of the total) of the remaining 18 children who continued to receive the music containing Hemi-Sync showed positive changes in the behaviors being worked on in treatment. Changes that were observed included improved focus of attention, reduction in tactile defensiveness and overall improvement in sensory organization, increased physical relaxation, improved motor coordination, and reduction in fearfulness. All of the children exhibited a greater openness and enthusiasm for learning. Changes were not evident until Hemi-Sync was introduced. In several instances behavioral changes were noted with the calming music background; however, the degree of change and permanence of change were more pronounced when Hemi-Sync was combined with the music.

Varney (1988) completed a study of six boys between the ages of 15 and 29 months who were enrolled in a home-based early intervention program. Diagnoses included Down syndrome, neurological disorder, and developmental delay. Varney used a modified single-subject design to compare the responses of 3 children who listened to Metamusic with Hemi-Sync (relaxed focus tapes) during weekly one-hour intervention sessions for a period of 4-5 weeks to the responses of three matched children who listened to the same music without the Hemi-Sync signals. Five of the six children in the study demonstrated improvements during intervention. The three children who listened to Metamusic with Hemi-Sync during intervention demonstrated greater improvement than the children who listened to the same music without Hemi-Sync. She concluded that playing Metamusic with Hemi-Sync during intervention appeared to improve the imitation of gestures, facial expressions, two-word phrases, and spontaneous use of two-word phrases. Significant increases in attending behaviors and child-initiated interactions also were observed.

During intervention with Metamusic with Hemi-Sync, changes in behavior occurred more quickly than would be expected. All three of the children who listened to the Metamusic with Hemi-Sync demonstrated steeper slopes of change during intervention. For example, one child increased recorded behaviors from 0% to 100% between the first and second intervention sessions. The other two children made increases of 42-45% between two or more intervention sessions. These changes also occurred earlier in the

intervention program than did the changes observed in the three children listening to the music alone. Seizures did not increase for the child with a neurological disorder and history of a seizure disorder during the period in which the Hemi-Sync signals were included in the intervention. This is also in agreement with the findings of Morris (Morris 1983, Morris 1985). Varney concludes that the study

“ . . . offer(s) evidence supporting the use of Metamusic with Hemi-Sync as an effective adjunct to a communication program which is appropriate to the needs of young children with developmental disabilities...Although the usefulness and effectiveness of Metamusic with Hemi-Sync requires additional empirical evidence, interventionists may find that playing Metamusic with Hemi-Sync during intervention with young children with developmental disabilities will improve attention behaviors, social interactions and communication. ” (p44-45).

Guilfoyle and Carbone (1997) reported the results of a preliminary study of 20 developmentally disabled adults with mental retardation. Subjects were matched on the basis of IQ, and were divided into experimental and control groups. Each group listened to music on stereo speakers while watching nature videos without sound tracks. Hemi-Sync signals in the alpha-beta range for focused attention/concentration were present in the music presented to the experimental group. The control group listened to the identical music without Hemi-Sync. Subjects were tested (pre-test and post-test) for short-term auditory memory, and sustained focus of attention before and after the video and music. In addition to the formal testing, each subject was rated on 6 scaled measurements of attentiveness and associated behaviors. Each subject attended 15 thirty-minute training sessions. Differences between the pre-test and post-test scores were compared for the experimental and control groups.

The group listening to the music containing Hemi-Sync signals (i.e., Metamusic) showed statistically higher scores on the digit symbol test, and significantly higher ratings on resistance to distraction, attention to speech, level of alertness, and level of irritability. The control group, listening to music only, did not show similar changes.

Anecdotal Observation

Since 1988 a larger group of therapists and educators have been using Metamusic tapes in remedial programs (Bullard 1995, 1997; Morris 1991,1990; Sornson 1996). Although formal research is not avail-

able to document these observations, the consistency with which the same observations are made by different professionals, in different settings, and with different children gives some validity to the observations.

Children with sensory processing disorders frequently show increased abilities to modulate or regulate their responses to sensory input. They are calmer and more focused in their attention. Their negative reactions to touch, texture, and other natural sensory stimuli diminish, and they are more comfortable with physical touch and a wider variety of food. Many children with severe sensory processing issues have a diagnosis of autism or pervasive developmental disorder. Greater eye contact, reduced stereotypic behaviors, and increased attention to language and social environments is often seen in this group of youngsters.

Children with cerebral palsy and other disorders resulting in movement dysfunction, often show a reduction in spasticity and hypertonicity, easier movement patterns, and greater coordination of sucking, swallowing, and breathing. Their overall feeding patterns are often smoother and more rhythmical.

Medically fragile children and those with a history of frequent hospitalization and invasive procedures are often highly resistant to feeding intervention. They have created internal barriers to protect themselves from the discomfort that has been associated with suctioning, intubation, and nasogastric tubes. In a Metamusic environment, these children become more discriminating of adult intentions. They are more open to adults who introduce them to oral input in a caring and gentle manner, developing greater trust in pre-feeding and feeding approaches in a child-directed therapy program. They will generally retain the protection discrimination and resistance to adults whose intention is to invade the mouth and obtain compliance. Their high level of anxiety is reduced, and they show more mature coping strategies.

Children with attention deficit disorders (with and without hyperactivity) are often helped by Metamusic. They learn to sit quietly without fidgeting for longer periods and are better able to focus their attention.

Case Study: A Child with Autism

A 2 year-old boy with autism showed severe disorganization of his response to sensory input and sensory overload. He had limited eye contact, and engaged in stereotypic behaviors such as rocking and flapping his hands. He was fussy and irritable, or withdrawn into his internal world. He disliked touch to his upper body, hands, face, and mouth. When he

reached a state of sensory overload, he released the stress through gagging and vomiting. Although he liked children's music tapes and quiet classical music, these types of music had no effect on his sensory behaviors. In some instances they appeared to increase his difficulty with his environment. He drank formula from a bottle, and seemed more organized with the rhythmical sucking pattern that it required. He ate three small meals of pureed food per day. However, the random sensory input from the spoon, food tastes and texture created maximum stress. He pushed back in the chair, clamped his mouth closed, pushed his mother's hand and the spoon away, and cried. He was able to cope with the situation by focusing his attention hypnotically on a child's music videotape to cut out interaction and other sensory input.

After an initial 30-minute session with a relaxed focus Metamusic tape, he accepted touch to his hands and chest, initiated eye contact and smiling, and appeared to be calm and peaceful. Metamusic tapes were incorporated into a sensory-based treatment program for the next week. He was seen for 5 hours of intervention per day, with Metamusic used approximately 50% of the time. He continued to show increased interaction and eye contact, began to explore toys, imitated his body movements and facial expression in a mirror, and was able to regulate his response to sensory input more efficiently. Gagging and vomiting ceased. During mealtimes he was more open to changes in his physical position in the chair and presentation of the food. Although he still needed his videotape at mealtimes, he was more interactive with his mother and began to come forward to initiate a bite from the spoon when a Metamusic tape was played 30 minutes prior to the meal. He no longer cried and pushed the food away.

During the next 6 months of home-programming, his parents felt that he was less alert and tended to become sleepy when a relaxed focus Metamusic tape was played. When a concentration Metamusic tape was substituted, he was more focused, and no longer became sleepy. Within 10 months, he was taking a wide variety of foods, and had progressed to chewing mashed and chopped textured foods.

Case Study: A Child with Cerebral Palsy

A 3 year-old boy with cerebral palsy received most of his meals through a gastrostomy feeding tube because of severe disorganization of swallowing and breathing. He had recently shown an interest in eating, and his parents gave him small oral feedings each day. During these meals, his breathing was noisy and labored, and he showed frequent choking and

coughing. He had great difficulty moving his body volitionally because of high muscle tone and strong tonic reflex movement patterns. He frequently arched into hyperextension of his body and head. He drooled profusely. The base of his tongue was pulled back into a slightly retracted pattern, intermittently occluding the airway. This pattern contributed to his difficulty with breathing coordination during eating and drinking. Although it was possible to use gentle manual traction under the chin to draw the base of the tongue forward, he consistently resisted this treatment strategy. His sleeping patterns were stressed. As he fell asleep, his body went into strong spasms that were accompanied by tongue retraction and severe obstruction of the airway. These episodes of obstructive sleep apnea were terrifying because of their sudden onset, and his inability to breathe. His panic and increased tension resulted in stronger reflexive retraction of the tongue and long periods of apnea. He resisted going to sleep, and it often took 3-4 hours for him to calm down and sleep. When a sleep medication (such as chloral hydrate) was given, he was groggy and unalert the following morning. His parents preferred to help him learn to go to sleep while they were up. They gave lesser amounts of the medication in the late evening when they went to bed. Without this medication, the sleep-wake-apnea episodes continued throughout the night, and the whole family experienced sleep deprivation.

A relaxed focus Metamusic tape was used initially during quiet, on-the-lap activities such as listening to a story. This enabled the therapist to feel any changes in muscle tone and movement coordination that were related to Hemi-Sync. During these sessions, his postural tone reduced, and he could interact with a story book as his hand was guided to different pictures. He accepted the therapist's hand under his chin to facilitate a more forward position of the tongue. He was interested in the contrast between his noisy and quiet breathing patterns, and began to maintain the quiet pattern independently for longer periods.

Oral feeding sessions were held with the child supported on his mother's lap. Physical assistance was given to keep the tongue out of the pharyngeal airway. Sucking and swallowing movements became more regular and rhythmical, and were well coordinated with breathing. There was no coughing or choking. A modified barium swallow study several months later showed an efficient swallow with no aspiration. A relaxed focus Metamusic tape was used at each meal, and intermittently throughout the day. The child learned to use a more forward head position and keep the base of the tongue out of the airway. At the end of the 5 day intensive treatment program, he used a quiet breathing pattern more than 75% of the

time, and was spontaneously swallowing his saliva. Drooling was minimal.

Evening therapy sessions were held at bedtime. A Metamusic sleep tape was introduced to help him relaxation fall asleep with less physical and emotional stress. The therapist used the positive suggestions that he could sleep peacefully, and breathe quietly. Intervention to inhibit his tonic reflex patterns and keep the tongue in a more forward position was used at the first sign of the spasm. Over a 4 day period he was able to fall asleep within a 30 minute period. He had one or two small spasms during the initial sleep period, but was free from apnea episodes. An adult remained with him for physical and emotional support during this period, repeating the positive suggestions for easy sleep, and helping him maintain a forward tongue position. Three weeks after the program began, his parents weaned him from the sleep medication, and he slept through the night.

Guidelines for Using Metamusic

Selecting Tapes

Identify the child's typical sensorimotor, emotional, and learning behaviors that could be influenced by a Hemi-Sync Metamusic. Observations may include muscle tone, motor coordination, breathing, focus of attention, activity level, response to touch, response to passive and active movement, acceptance of unfamiliar activities, and imitation abilities. Don't introduce Metamusic until you are familiar with the child's responses to your therapy program without the support of binaural beats.

Select a category of Metamusic (i.e. relaxed focus, concentration, sleep) that supports your general treatment directions for the child. The relaxed focus tapes such as Metamusic Inner Journey, Metamusic Cloudscapes, and Metamusic Masterworks provide an excellent background for most children with sensorimotor difficulties. Because they stimulate an open focus of attention, they work well in an interactive environment with a therapist or teacher. They also support sustained physical and mental relaxation when the child is alone. Relaxed focus tapes are usually selected for children with high muscle tone or sensory processing and integration problems (including those of autism and pervasive developmental disorders). The Metamusic concentration tapes such as Metamusic Remembrance and Metamusic Einstein's Dream, are designed for a narrower focus of attention and a higher level of alertness. They are appropriate for many children who have poor attention skills and hyperactivity. The higher frequency binaural beats in the tapes stimulate brain wave patterns in the high alpha and low beta ranges that are often missing in

children with attention deficit disorders. These tapes may also be more effective for children who consistently become sleepy when the relaxed focus tapes are used. Sleep tapes, such as Metamusic Sleeping Through the Rain and the Sandman Suite tapes, are used primarily to promote a restful sleep or unstructured relaxation.

After selecting a category, choose a tape that you like. If a tape is used at home or in therapy over open speakers, it is very important for everyone listening to like the tape. Remember that the specific music that contains Hemi-Sync is just as important as the binaural beat signals. You like some types of music, are indifferent to some, and often dislike others. If you select music that is unpleasant for you or that you dislike, you automatically communicate your discomfort to the child. Hemi-Sync doesn't make the brain respond in a specific way just because of the sounds. It invites the brain to participate. If an adult or child is saying "no" inside to the sound of the music, the brain won't participate, and Hemi-Sync won't work.

Identify the child's verbal or non-verbal patterns of communication. How does the child express likes, dislikes, or preferences in other situations (i.e., turning away, increasing the level of hyperactivity, reducing eye contact, arching, crying or fussing? looking toward the object, reaching, smiling?)

Choose quiet times to introduce Metamusic when Hemi-Sync can support the general activity you have selected. The tapes are especially effective at meal-times, while reading the child a story or looking at a book, while studying, or other similar times when quiet focus of attention is an advantage.

Observe very carefully for any cues that the tape is not acceptable. Even very young or delayed children will tell you through non-verbal cues whether the music and Hemi-Sync is okay. If you sense that it's not okay, don't use it. Children may turn off the music, become irritable, cry, or tune out. If you suspect that the sound is aversive, turn it off for that session. Explore several different tapes during other therapy sessions. Observe the child's response again. This will help you know whether the child's negative response is to a particular piece of music, a category of Metamusic tapes, or to the binaural beats of Hemi-Sync. Hemi-Sync tapes should never be used with a child who does not like them.

Observe the child's reaction for cues that he enjoys Metamusic and likes to have the music on. A child may become more relaxed. She may smile or participate more fully in the activity. Some children look toward the tape player, or ask for more music if the tape is turned off. The child may not react differently when Metamusic is used initially. However, if the child's

reaction is neutral and Metamusic helps you focus or relax, continue to use it.

Initially keep a journal describing the child's behavior and responses when you are using Metamusic. You may wish to select a specific area or behavior to measure. If you have taken the same measurements for a number of sessions before you introduce the music, you will have established a baseline for comparison. The journal and any measurements you make will allow you to decide how valuable the Metamusic background has been for the child. It is also useful to keep a journal describing your own reactions to the Metamusic tapes. This will help you decide whether Metamusic enhances your own learning, creativity, and interaction in therapy.

Although generalizations can be helpful in selecting Metamusic tapes, be aware of unique individual responses to specific tapes. Although the Metamusic concentration tapes help most individuals be more alert and focused, they can put some to sleep. While many hyperactive children prefer the concentration tapes, others are able to concentrate quietly with the relaxed focus tapes. A few hyperactive children have listened to a sleep tape during the day. Others fall asleep immediately with a sleep tape at night, and are alert and irritable if the same tape is played during the daytime.

The speed of behavioral change shows many individual variations. Some children and adults change dramatically. A few children with severe sensory defensiveness respond very rapidly, often showing observable shifts in the sensory threshold and comfort level within 10-15 minutes. Others like and accept the music, and show slower or more subtle changes in behavior or learning. Be aware of small changes that occur, and resist the temptation to eliminate Metamusic because large shifts do not take place quickly. For example, a child may engage in a familiar activity such as working a puzzle in the same way with or without the music. However, when the music is on, the child shares the activity with the mother and even leans against her. When the child works the puzzle without Metamusic, he moves slightly away and prefers to play alone. If changes in working the puzzle were the sole measure of effectiveness, the more subtle interpersonal change might go unobserved.

There is no set schedule for using Metamusic. Some children profit from using Metamusic throughout the day; others benefit more from brief (30-45 minute) periods once a day. Monroe likened Hemi-Sync to the training wheels on a bicycle. Hemi-Sync tapes are essentially training wheels for the mind that assist the brain with a new way of organizing and

integrating sensorimotor experiences. Once this has been learned, the training wheels are no longer necessary. This creates a long-term learning or carryover effect. Therefore, it is not necessary to use Hemi-Sync tapes throughout the day for them to be effective. In my original pilot study (Morris 1985) most children listened to a Metamusic tape for only one hour a week during therapy. Long lasting physical and behavioral changes were observed. If Metamusic is used throughout the day, it is important to use breaks during which no music is played. This creates a contrast for the child, and provides an opportunity to continue the behaviors facilitated by the music.

Equipment

Metamusic tapes must be played on a stereo tape playback unit. The Hemi-Sync effect is created by slightly different frequencies on the two channels of a stereo tape. This will not occur if the tapes are played on a monaural tape player. A tape player with a continuous auto-reverse feature or a CD player with programmable repeats are preferred. This type of player eliminates the distractions that occur when a tape reaches the end and must be turned over in the middle of an activity. It allows a tape or CD to be played all night.

Although the binaural beat effect is stronger when headphones are used, this is often undesirable or impossible with small children. A simple stereo boom-box works well for individual or small group therapy using an open-speaker presentation. The boom-box can be placed in front of or behind the child. It is very important that the child be "between the speakers". Do not place the speakers to the side of the child or have them in a different room of the house. A boom box or other stereo unit with detachable speakers is used to give the widest possible stereo sound separation if a tape is played for larger groups or in a classroom.

Headphones may work better with specific children or in special environments. Headphones allow the child to listen to music at a low volume in an environment where an open-speaker system is unavailable or undesirable. Music through headphones makes it possible for a child to listen to quiet music while driving in the car, in a classroom, or while taking a school examination when music is not appropriate for others in the same room. Since the binaural beat effect of Metamusic is more intense with headphones, listening through headphones may be important for children who have difficulty with focus of attention. Many children and teens enjoy having their own portable tape unit with headphones to be like an older sibling or a friend.

Location

Metamusic can be played softly in the background during individual therapy sessions, at home, and in the classroom to assist with relaxation and learning. Different considerations and guidelines may be used in each setting.

When Metamusic is used in individual therapy sessions, the child's responses to the music and to learning can be carefully observed. If the music is played in the background for therapy activities that are familiar, differences in the child's responses can be observed more easily. The therapist can identify individual areas of change in response to binaural beats and can help parents and teachers design a Metamusic program for other environments. Therapists can help the teacher identify individual children in the classroom who might benefit from the group use of this type of music.

When Metamusic is introduced into the home setting, the therapist (or teacher) should develop a plan with the family. This plan would include an agreement on the tapes to be used, the times or activities during which they will be used, and the frequency of use. A journal can be kept by the parents to note any changes in the child's behavior that they observe. A library of tapes that can be loaned to a family for several weeks is very beneficial. This enable them to listen to tapes with the child, and decide which ones work well at home. When the family has identified tapes that everyone likes, these can be purchased. Metamusic can be used at mealtime, bedtime, or in specific play or learning activities that are benefit from physical relaxation, mental alertness, and social interaction. Music can be used during an activity or prior to it. For example, the child might spend a quiet time with soft music playing for 30 minutes before the dinner meal; or the music might be used during the meal itself.

The teacher can have relaxed focus Metamusic playing in the background as children enter the classroom. This sends out a non-verbal message that the students can become more quiet and ready for the school day. Different tapes can be used for different classroom activities. For example, in a preschool program, one tape might be played during lunch while another would be used during rest time or table activities. In an elementary school classroom, a Metamusic concentration tape might be played during reading, while a tape that created a more relaxed focus might accompany creative language activities. Children will gradually associate the music with the activity and will learn to carry over the behaviors experienced with the music when it is not playing. Place the tape player so

that the speakers face the majority of the group. To receive the benefit of the stereo presentation of Hemi-Sync sounds, the speakers should be directed toward the students.

If Hemi-Sync Metamusic is used in the classroom with children with neurological or emotional dysfunction, it is particularly important to observe each child's reaction individually before playing the music to the entire classroom. A small number of these children may show a more disorganized or aversive response to the Hemi-Sync signals. It is helpful to identify children who appear to benefit and those who may indicate that they do not like the sounds. If there are children in the classroom who are clearly irritated by Metamusic tapes, the tapes should not be used while the sensitive children are in the room. The tapes, however, might be used with other children while a sensitive child is involved in a pull-out activity. Speakers can be directed so that they are not facing children who respond negatively to the binaural beats in a Metamusic tape.

Summary

Metamusic tapes containing the binaural beat patterns of Hemi-Sync open the door to learning for many children with developmental disabilities. Children with oral feeding difficulties have increased their skills and comfort level more efficiently when Metamusic was included in the learning environment. The sound technology is inexpensive, non-invasive, and effective. Metamusic makes an important contribution to most rehabilitation programs.

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